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Project:	Collis Primary School, Fairfax Road - Flood Risk Assessment
Prepared for:	extraspace solutions
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Document Issue Record

Project: Collis Primary School, Fairfax Road - Flood Risk Assessment

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Site Location: Collis Primary School, Fairfax Road, Teddington TW11 9BS

Proposed Development: Partial demolition of the existing structures and construction of a new school building and ancillary works.

Consultant		Date	Signature
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Contents

1. Site Information

Proposed Development and Location

1.1 The proposed development site is located at Collis Primary School, Fairfax Road, Teddington TW11 9BS.

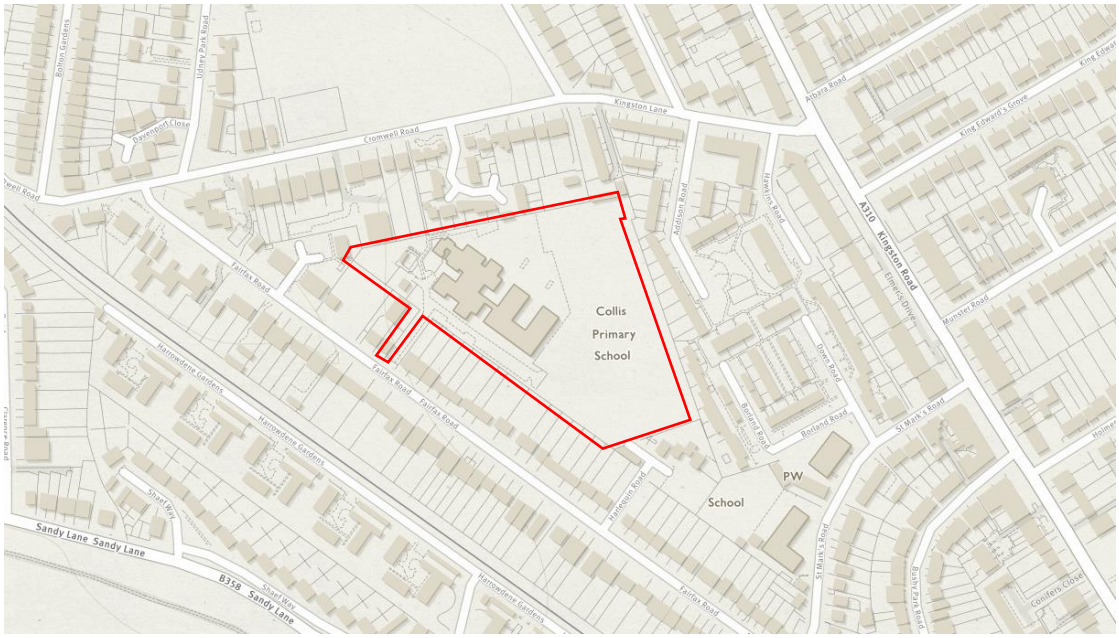

Figure 1: Site Location Map. Red outline encloses the proposed site. (Source: OS)

1.2 It is understood that the development is for the partial demolition of the existing structures and construction of a new school building and ancillary works. See Appendix 1 – Site Information.

Topography

1.3 Topographic levels across the site are relatively flat at 8.5mAOD (Source: 2m LiDAR data). The highest elevations are present to the west of the site, with lowest elevations to the south of the site.

Geology & Hydrogeology

1.4 The site's bedrock geology has been identified by the British Geological Survey's public mapping model as the London Clay Formation formed of clay and silt. The superficial deposits have been recorded at the site as Kempton Park Gravel Member - sand and gravel.

1.5 The proposed development site is not located within a Groundwater Source Protection Zone. The site is located in a Groundwater Vulnerability Zone defined as a Major Aquifer with High vulnerability (Source: MagicMap).Analysis of nearby borehole data indicates that the groundwater level in the wider site region is at approximately 3.5-4m below ground level (Source: BGS).

Water Bodies

1.6 River Thames is located nearest to the site, at approximately 1km to the northeast.

1.7 Several local open watercourses, connecting a network of ponds, are located to the south and southwest from the site, within Bushy Park.

1.8 The nearest reservoir to the site is the Island Barn Reservoir located at approximately 4km to the southwest from the site.

Sewers

1.9 The site is currently developed and located in a highly urbanised area therefore it is assumed that drainage infrastructure, in a combined or isolated form, exist at the site and wider area. This is assumed for both foul and surface water drainage.

2. EA Flood Map for Planning

2.1 The Environment Agency (EA) Flood Map for Planning indicates the potential spatial extent of fluvially driven flooding events or tidal flooding events. It is important to note that only the potential floodplain is shown; the mitigating effects of any flood defences currently in place are not considered.

2.2 The potential spatial extent of flooding is mainly determined by the intensity of the source of flooding (i.e. rainfall, storm tides), and quantified by its chances of occurring in any given year.

2.3 The National Planning Policy Framework (NPPF) defines three principal spatial extents, 'flood zones', that would be inundated during a given event. The definition of the NPPF flood risk zones is included in Table 1 below.

2.4 According to the EA Flood Map for Planning, the proposed site is located within Flood Zone 1 (Figure 2).

Zone		Description
1		Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2		Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
3	3a	High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
	3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

Table 1: Definition of the NPPF Flood Zones. Shaded cells denote the proposed development (Source: EA).

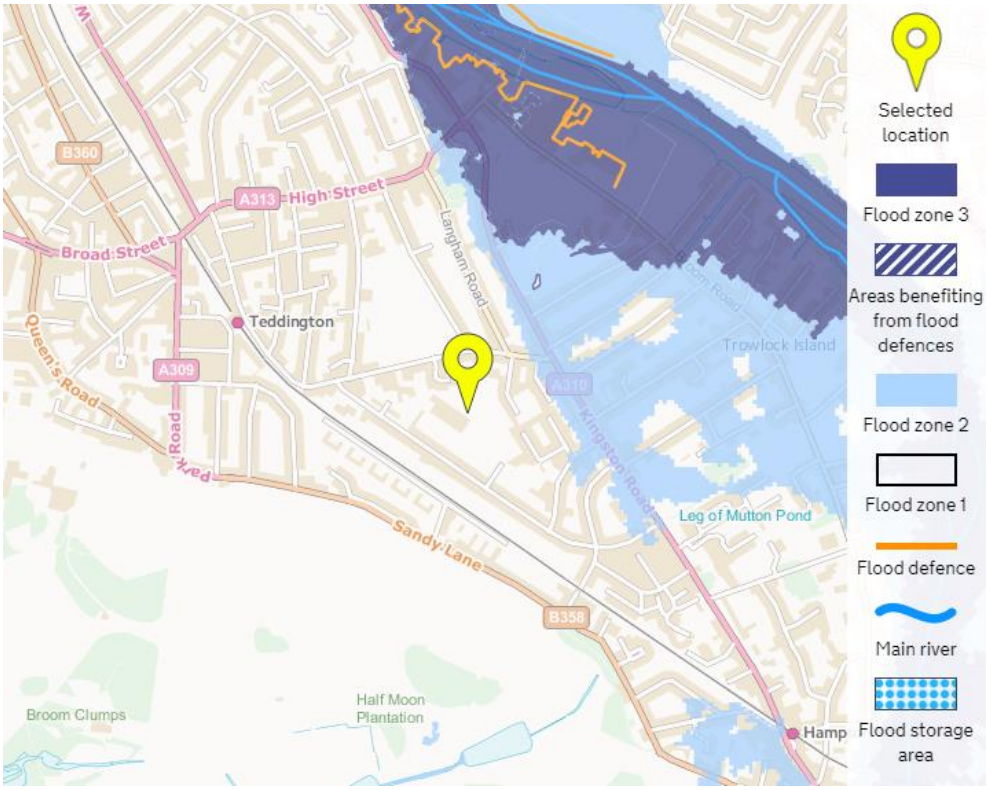

Figure 2: EA Flood Map for Planning. (Sources: EA)

3. Sequential Test/Exception Test

3.1 Under the NPPF, all new planning applications should undergo a Sequential Test. This test should be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain.

Vulnerability classification

3.2 Under the NPPF vulnerability classifications, the existing site usage (educational facility) is considered to be 'More Vulnerable'. The proposed development is for the construction of a new school unit, as such the vulnerability classification will remain 'More Vulnerable'.

3.3 The test refers to the EA Flood Zones described in Table 1. For reference, the NPPF Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table is reproduced below:

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	×	Exception Test Required	✓
	Zone 3b	Exception Test Required	✓	×	×	×

Table 2: The Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table as specified by NPPF. Shaded cells denote the proposed re-development. Please note: ✓ means development is appropriate; × means the development should not be permitted.

3.4 Using the principles of the Sequential Test outlined above, the proposed development is classified as 'More Vulnerable', and is located within Flood Zone 1. As such, under the NPPF, 'More Vulnerable' development would not require the implementation of the Exception Test and Sequential Test.

4 Flood Risk Analysis

Fluvial/Tidal

4.1 The EA Flood Map for Planning (Figure 2) confirms that the site lies within Flood Zone 1, at low risk of flooding from a fluvial/tidal source. Flood Zone 1 has a <0.1% annual chance of flooding from either of these sources.

4.2 The closest watercourse is the River Thames which is located approximately 1km north east of the site. The Environment Agency has classified the River Thames as an EA Main River.

4.3 Based on the above information, the risk from fluvial/tidal flooding to the proposed development is considered to be **not significant** due to the site's location within Flood Zone 1.

Surface Water (Pluvial)

4.4 The Richmond Surface Water Management Plan (SWMP, 2011) has identified the site to not be located in a critical drainage area (Figure 3).

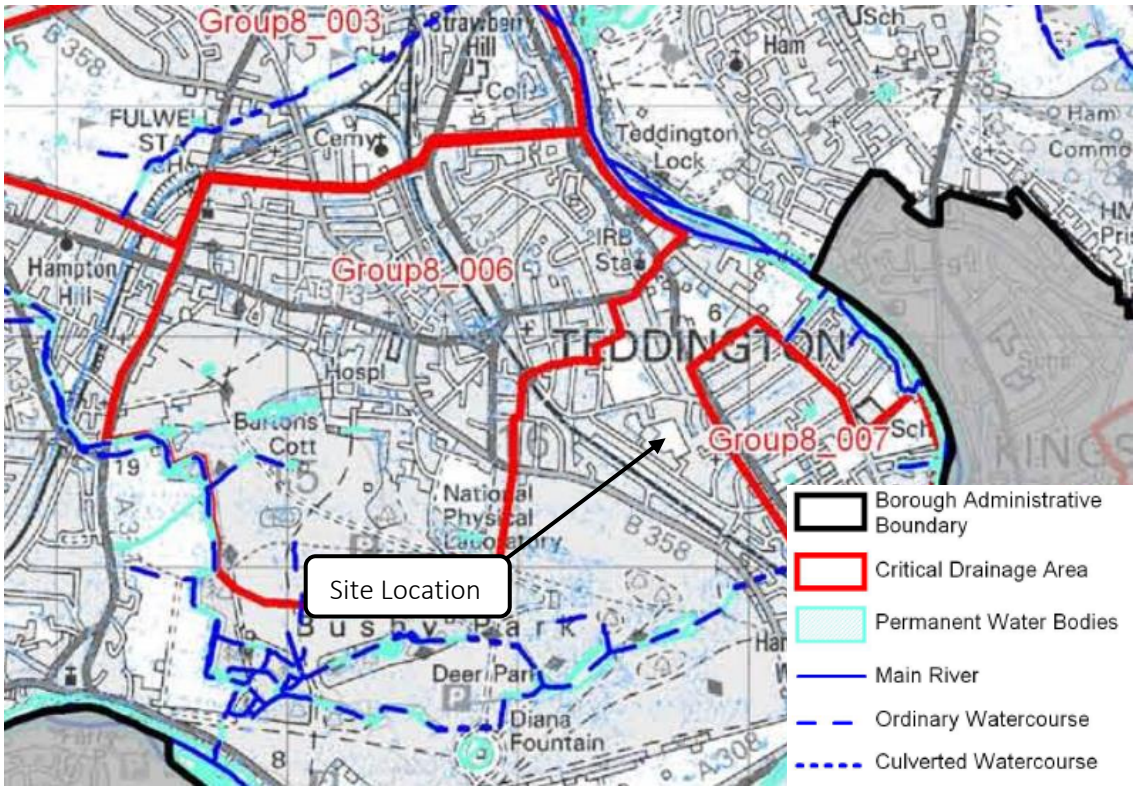

Figure 3: Locations of Critical Drainage Areas (Source: SWMP)

4.5 The EA's Risk of Flooding from Surface Water map shows the site to be primarily within an area of 'Very Low', 'Low' and 'Medium' risk from surface water flooding (Figure 4), with areas of 'low' and 'Medium' risk confined primarily to the southern and eastern side of the existing school. These areas have between 1% and 3.3% annual chance of flooding and between 0.1% and 1% annual chance of flooding, respectively. Mostly, the site is at 'Very Low' risk of surface water flooding, these areas having a less than 0.1% annual chance of surface water flooding.

4.6 The proposed new school building is located to the northern side of the existing school, as such, lies within an area defined as having a 'Low' risk of surface water flooding.

4.7 The EA Surface Water Flood Depth Map for the High Risk Scenario (high likelihood of occurring) event indicates that the majority of the existing school would not experience any flood depths on site during this event (Figure 5).

4.8 The EA Surface Water Flood Depth Map for the Medium Risk Scenario event indicates that the majority of the site would not experience any flood depths on site during this event, with only a few regions near the existing school potentially experiencing up to 300mm of flooding (Figure 6).

4.9 The EA Surface Water Flood Depth Map for the Low Risk Scenario event indicates that areas near the existing school might accumulate to up 300mm of flooding during this event (Figure 7).

4.10 The EA Surface Water Flood Velocities Map (not shown here) for the Low Risk Scenario shows that water would not flow at velocities greater than 0.25m/s, indicating these areas are topographic depressions, pooling water from the wider site area.

4.11 As such, the risk of flooding to the site from surface water is deemed to be relatively low.

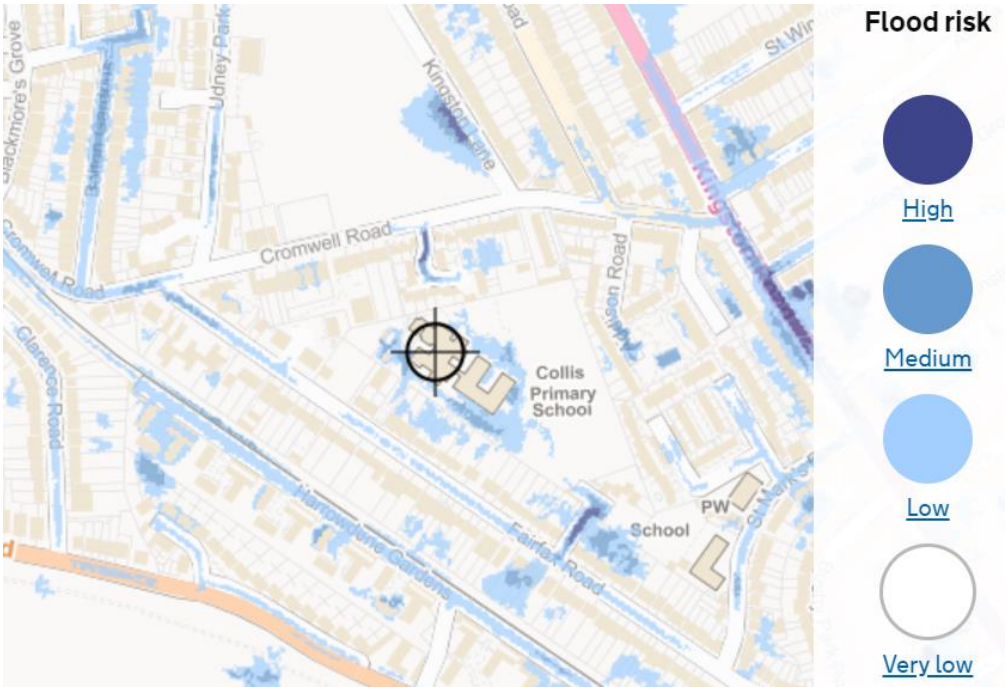

Figure 4: EA Surface Water Flood Risk Map. (Source: EA)

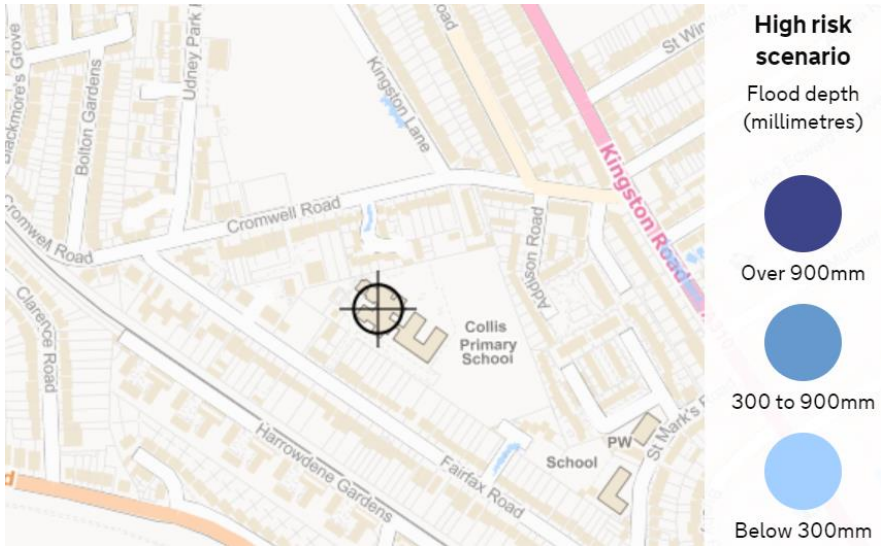

Figure 5: EA Surface Water Depth (high risk scenario) Map. (Source: EA)

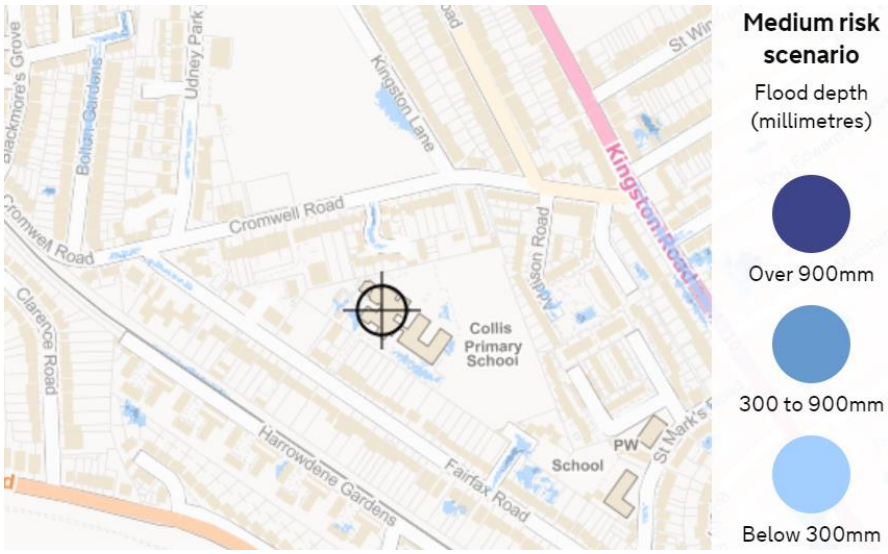

Figure 6: EA Surface Water Depth (medium risk scenario) Map. (Source: EA)

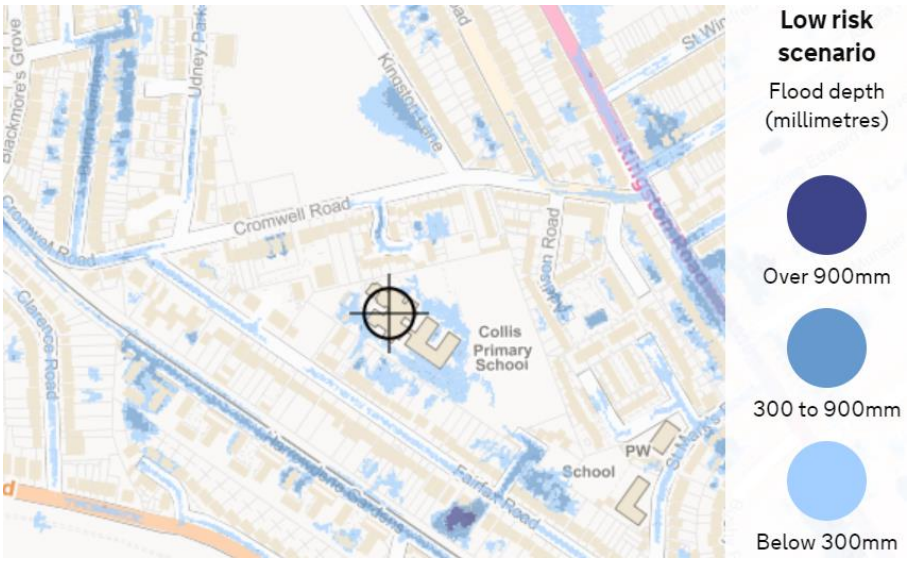

Figure 7: EA Surface Water Depth (low risk scenario) Map. (Source: EA)

Groundwater

4.12 Figure 3 of the Richmond Surface Water Management Plan (SWMP, 2011) maps the potential for elevated groundwater the Borough, along with EA records of groundwater flooding incidents (Figure 8).

4.13 Figure 8 below indicates that the site is located within an area defined as having potential for groundwater to reach the surface and for flooding to occur. Two EA groundwater flooding records are shown on the map to the southwest of the site, however no further information has been provided in regards to the exact location or severity.

4.14 As such, the risk of flooding from groundwater sources is deemed to be **relatively high**.

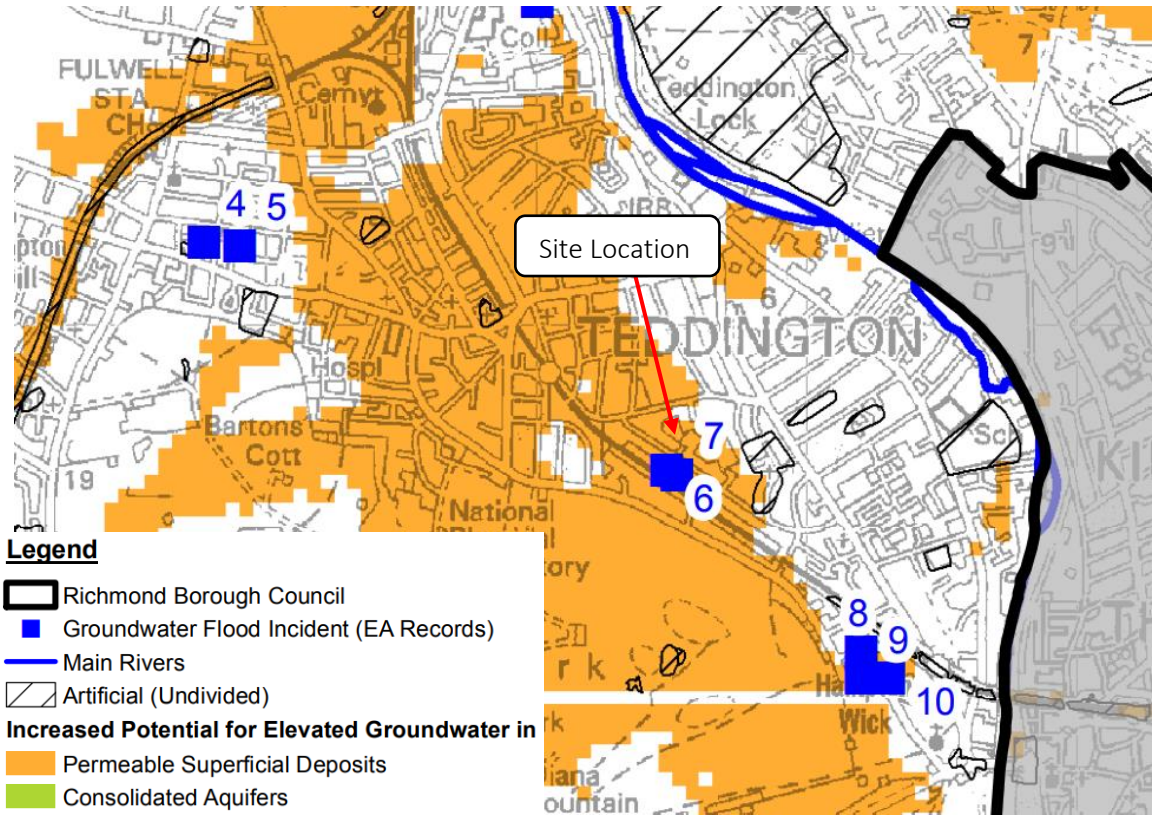

Figure 8: Increased potential for elevated groundwater across the Borough of Richmond. (Source: Appendix C2 - Figure 3, Richmond SWMP, March 2011)

Sewers

4.15 Figure D-5 of the Richmond SWMP maps the location of sewer flooding records provided by both Thames Water and Croydon Borough Council (Figure 9).

4.16 The Sewer Flooding Records Map (Figure 9) shows that the **postcode area** within which the proposed development site is located has between 1 and 5 recorded internal or external flooding events as a result of sewer flooding.

4.17 No records were found to suggest that the site has flooded from sewer sources historically and therefore the risk of flooding from sewers is deemed to be **relatively low**.

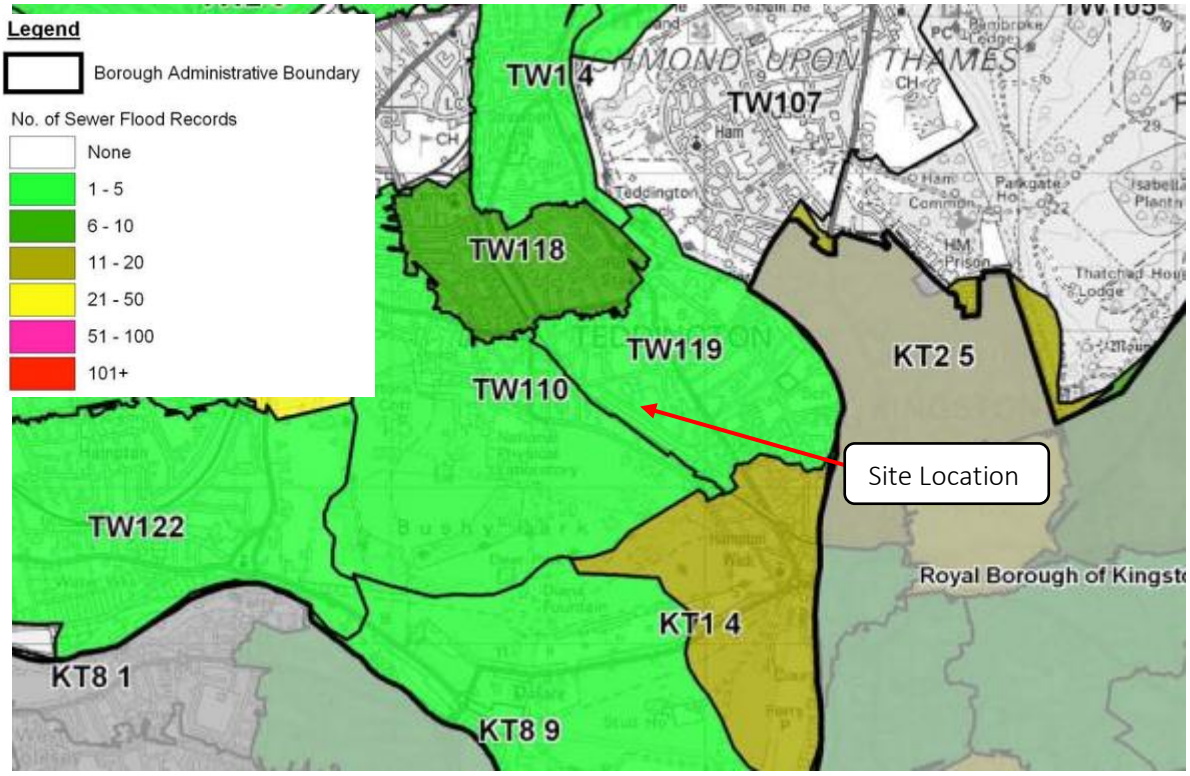

Figure 9: Records of sewer flooding across the Borough of Richmond. (Source: Appendix D - Figure D-5, Richmond SWMP, March 2011)

5. Residual Risks

5.1 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:

- the failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;
- failure of a reservoir, or;
- a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

5.2 The site is located in area that does not benefit from the presence defences as such the risk of flooding due to defence breach or overtopping is considered negligible.

5.3 The EA 'Flood risk from reservoirs map' indicates that the site is outside the maximum extent of reservoir flooding.

6 Flood Risk Management Measures

6.1 The existing site resides in EA Flood Zone 1 according to the EA Flood Map for Planning ("Low Risk" of flooding as defined in the NPPF).

6.2 Given that the site itself is not at risk, but resides in an area at risk of surface water flooding, the proposed development requires flood mitigation measures. As such, it is recommended the developer implements the following measures:

- Raise threshold levels/floor levels at least 150mm above external ground levels to mitigate against overland flows;
- Any new impermeable surfaces or any impermeable surfaces affected as a result of the development should be constructed/replaced with permeable alternatives.
- Non-return valves to be fitted to all drain and sewer outlets;

6.3 Section 4.10 identifies areas deemed to be topographic depressions which pool water from the wider site area during low risk surface water flooding events. According to the proposed plans, the new school building would be located partially within the topographic depressions therefore water would be displaced to other on-site or off-site areas during low risk surface water flooding events. It is recommended to assess various solutions (e.g. SuDS) to mitigate against the potential detrimental effects of water displacement to the site and others.

6.4 Given that the site and all of the surrounding roads are located in Flood Zone 1, there is no requirement for an evacuation route as detailed in the NPPF.

7. Off Site Impacts

Impact to Flood Risk Elsewhere

7.1 Given the site is located in Flood Zone 1, there is no offsetting fluvial flood storage, and no requirement to provide compensatory flood storage (as in the NPPF). As such, the proposed development will have no impact with regards to flood plain storage capacity and the hydraulics of local watercourses.

Generation of Runoff

7.2 The proposed development is for the partial demolition of the existing school and construction of a new school building. The plans provided indicate a soakaway within the playing field at the rear of the school. The field was also enlarged recently.

7.3 It is recommended that the developer discharges the surface water runoff via the existing management system associated with the existing development on site.

7.4 To provide further betterment, it is also advised that any new surfaces or any impermeable surfaces affected as a result of the development should be constructed/replaced with permeable alternatives.

7.5 It is suggested to further assess the surface water runoff generation on site and potential solutions to reduce flood risk in a bespoke SuDS assessment.

8 Conclusion

8.1 Ambiental Technical Solutions Limited has been appointed to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment for the proposed development at Collis Primary School, Fairfax Road, Teddington TW11 9BS.

8.2 It is understood that the development is for the partial demolition of the existing structures and construction of a new school building and ancillary works.

8.3 With reference to the Environment Agency (EA) national-scale flood mapping created on behalf of the EA, the proposed development is located within Flood Zone 1, (Low Risk; <0.1% annual tidal/fluvial flooding). The site is considered to be a 'More Vulnerable' development under the vulnerability classifications within the NPPF.

8.4 Under the NPPF, the existing site usage (educational facility) is considered to be 'More Vulnerable'. The proposed development is for the construction of a new school building, as such the vulnerability classification will remain 'More Vulnerable'.

8.5 The EA's Risk of Flooding from Surface Water map shows the site to be primarily within an area of 'Very Low', 'Low' and 'Medium' risk from surface water flooding, with areas of 'low' and 'medium' risk confined to the southern and eastern side of the existing school.

8.6 The London Borough of Richmond SWMP has identified the site to not be located in a critical drainage area.

8.7 It is recommended that the developer discharges the surface water runoff via the existing management system associated with the existing development on site.

8.8 To provide further betterment, it is also advised that any new surfaces or any impermeable surfaces affected as a result of the development should be constructed/replaced with permeable alternatives.

8.9 As such and given that:

- all built structures will be built entirely within Flood Zone 1;
- no or negligible flood depths during a 'Low' Risk flooding scenario;

following the guidelines contained within NPPF, the proposed development type is considered to be suitable assuming appropriate mitigation can be maintained for its lifetime.

Appendix A- Site Plans

Preliminary

NOTES:

- Do not scale from this drawing.
- Work only to figured dimensions.
- All dimensions to be checked on site prior to commencement of work or manufacture.
- Architect to be informed of any descrepancies

Site Plan

- PHASE 1
- PHASE 2
- Vehicle Access
- Pedestrian Access
- Construction Site
- School Site
- 01 Toilets / welfare and offices (labelled)
- 02 Area for material storage
- 03 Parking area (Two cars)
- First aid kit on site office

NOTE:

- Construction entrance shown must be used.

NO:	BY:	CHK:	REVISION:	DATE:
P2	SG		Revised to comments	11.07.18
P1	SG		Preliminary	04.07.18

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Email: Info@extraspacesolutions.com

CLIENT: ESFA

PROJECT: Collis Primary School

DRAWING TITLE: Phase 1 Construction of School

SCALE:	2:1@A1
DATE:	July'18
DRAWN BY:	Sharwari
CHK BY:	Paul S

DRAWING NO: 2025-ESS-XX-ZZ-DR-W-700-P2

Preliminary

NOTES:

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Site Plan

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NO:	BY:	CHK:	REVISION:	DATE:
P2	SG		Revised to comments	11.07.18
P1	SG		Preliminary	04.07.18

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Clondalkin, Dublin 22.
Tel: (01) 467 3100 Fax: (01) 467 3150
Email: Info@extraspacesolutions.com

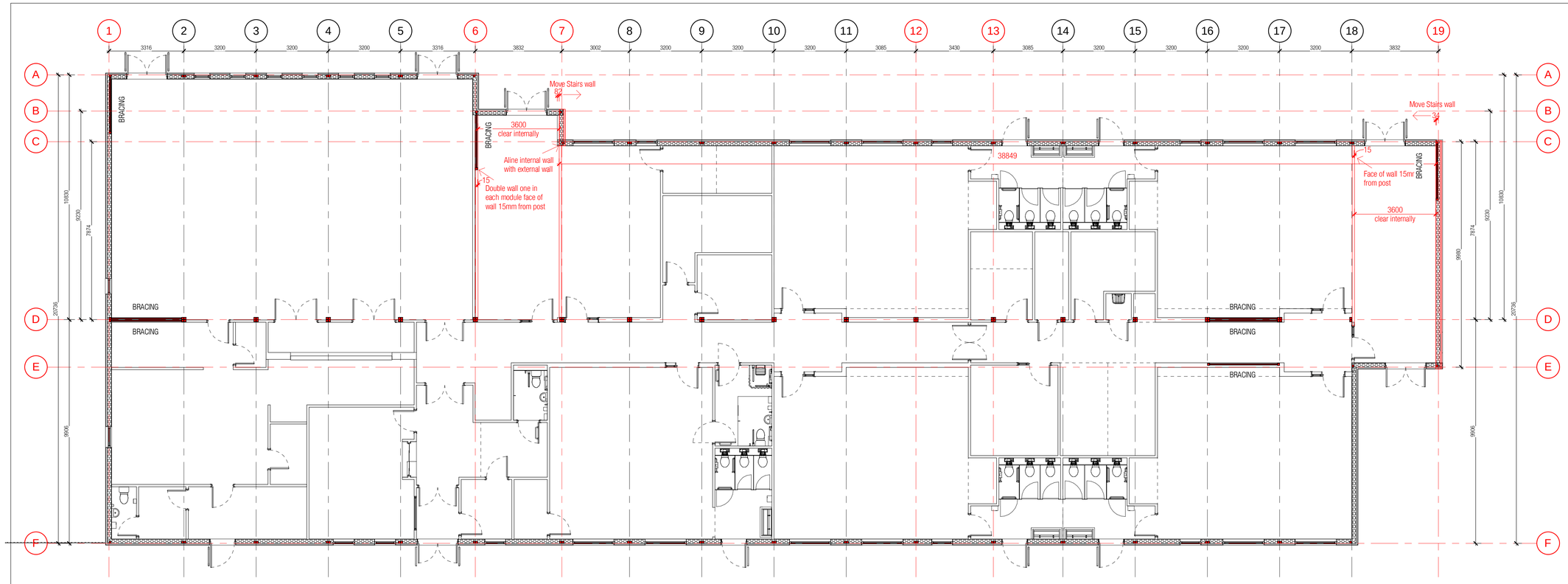
CLIENT: ESFA

PROJECT: Collis Primary School

DRAWING TITLE: Phase 2
Demolition of EFAF, EFAD, EFAA

SCALE:	1:250@A1
DATE:	July'18
DRAWN BY:	Sharwari
CHK BY:	Paul S

DRAWING NO: 2025-ESS-XX-ZZ-DR-W-701-P2



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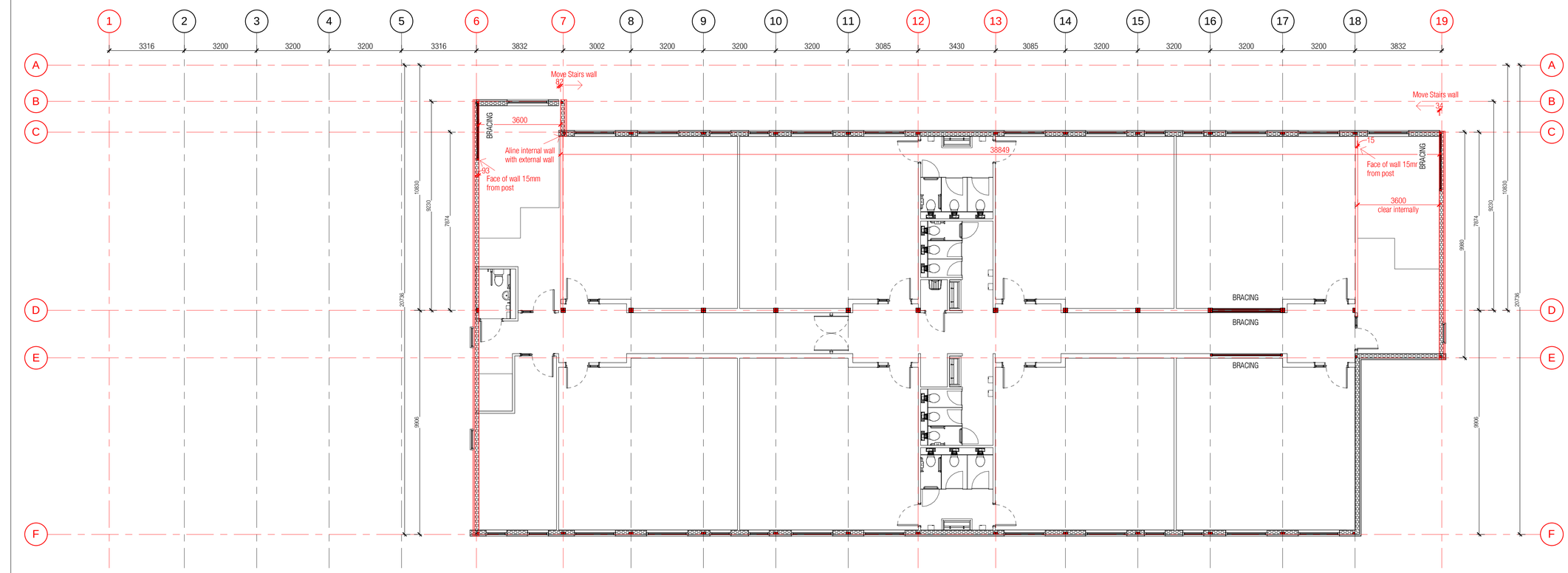
1 : 100



2 LEVEL 1
1 : 100

PRELIMINARY

NOTES

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NO:	BY:	REVISION:	DATE:
P1	COC	Grids / Wall/ and post location added as per comments on layout	01.02.18

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offsite construction specialists

STATUS	PURPOSE OF ISSUE

CLIENT
ESFA

PROJECT
Pound Hill Junior School

TITLE
Floor Plans - Grid, Post and Wall setting out

DRAWN BY	CHECKED BY	DATE
C.O'Connell	Checker	01/31/18

SCALE (@ A1)	PROJECT NUMBER
1 : 100	2027

DRAWING NUMBER	REV
2025- ESS- XX- XX- DR- W- 100	P1